CSc 3320: Systems Programming

Spring 2021

Midterm 2: Total points = 100

Assigned: 11th Apr 2021, Sunday 11:59 PM **Submission Deadline: 18th Apr 2021, Sunday, 11.59 PM (No extensions. If your submission is not received by this time then it will NOT be accepted.)**

Submission instructions:

1. Create a Google doc for your submission.
2. Start your responses from page 2 of the document and copy these instructions on page 1.
3. Fill in your name, campus ID and panther # in the fields provided. If this information is missing TWO POINTS WILL BE DEDUCTED.
4. Keep this page 1 intact. If this *submissions instructions* page is missing in your submission TWO POINTS WILL BE DEDUCTED.
5. Start your responses to each QUESTION on a new page.
6. If you are being asked to write code copy the code into a separate txt file and submit that as well. The code should be executable. E.g. if asked for a C script then provide myfile.c so that we can execute that script. In your answer to the specific question, provide the steps on how to execute your file (like a ReadMe).
7. If you are being asked to test code or run specific commands or scripts, provide the evidence of your outputs through a screenshot and/or screen video-recordings and copy the same into the document.
8. Upon completion, download a .PDF version of the google doc document and submit the same along with all the supplementary files (videos, pictures, scripts etc).

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Questions 1-3 are 20pts each. Question 4 is 40pts

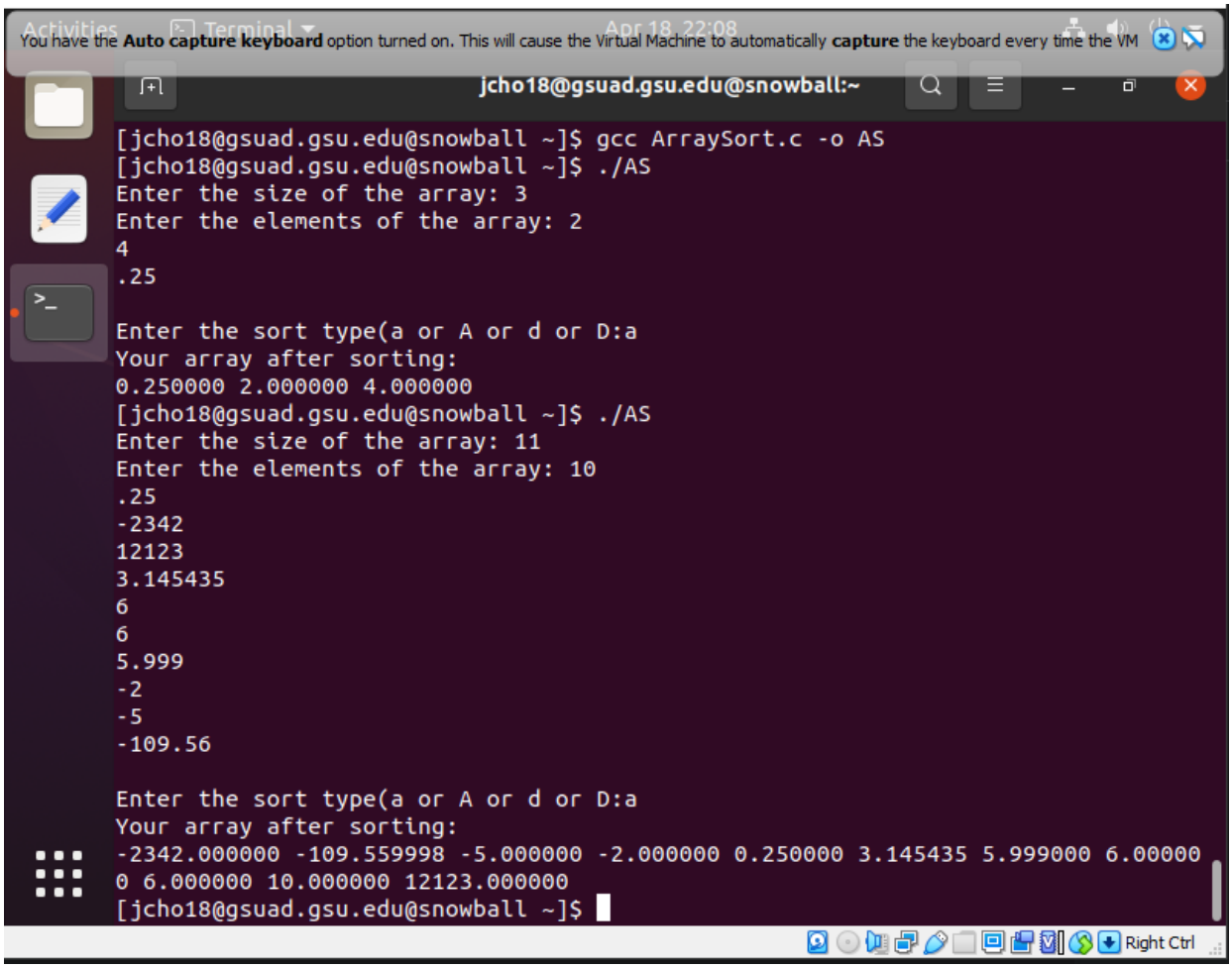
All programs have to be well commented. Non commented programs will receive 0 points. Comments have to be easily comprehensible and concise.

1. Consider the array given below. Write a C program that must be able to sort the elements in the array. You must use pointers in your code to work with the arrays. The sort functionality must be implemented as a separate function named “sort_numeric()”

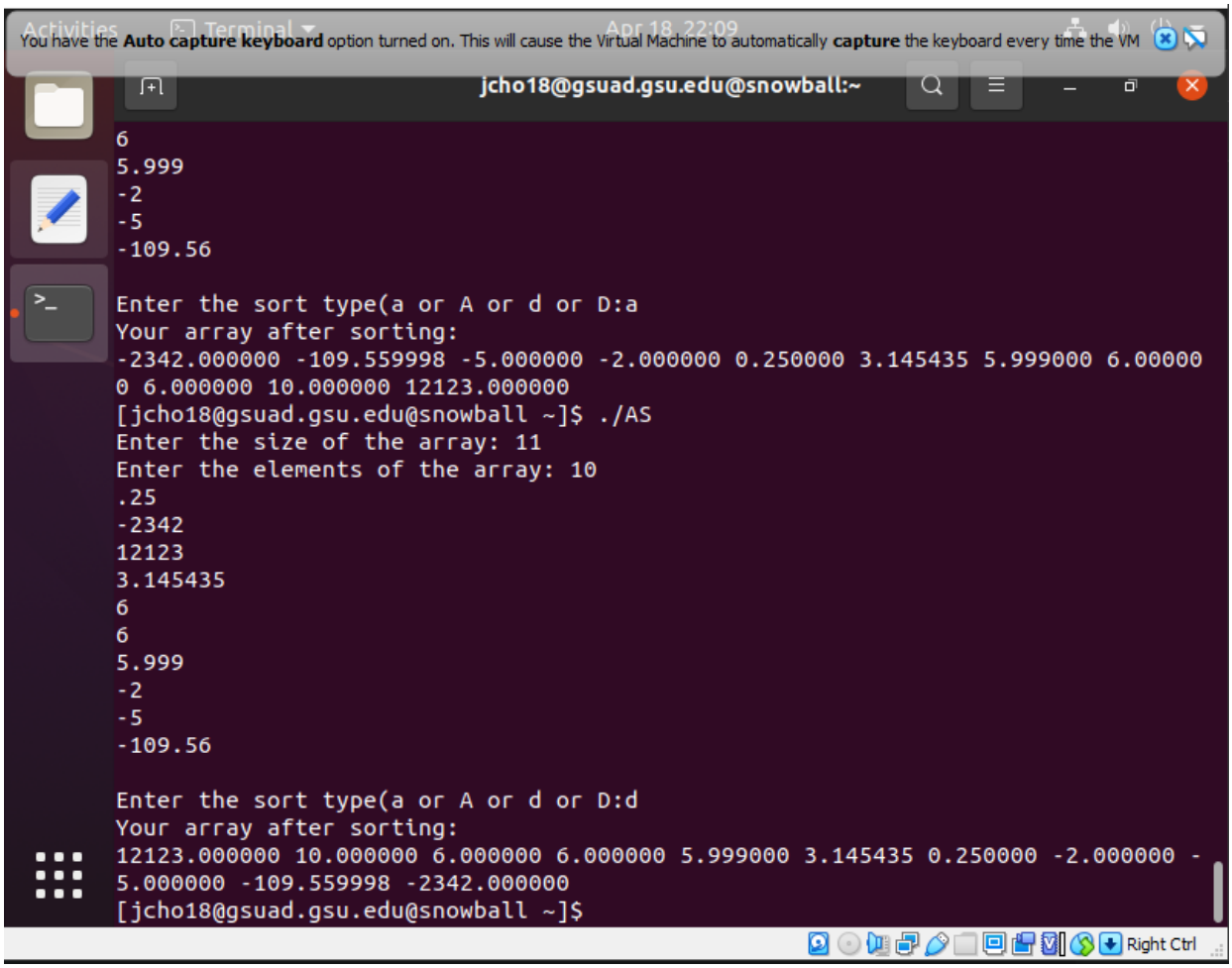
   Array for your evaluation

   [10, 0.25, -2342, 12123, 3.145435, 6, 6, 5.999, -2, -5, -109.56]

   If given user input A or a: sort in Ascending order



   If given user input D or d: sort in Descending order



2. Consider the list of names given below. Write a C program that will first create a string array that will contain this list and then sort the elements in the array as per alphabetical order. You must use pointers in your code to work with the arrays. The sort functionality must be implemented as a separate function named “sort_alphabetic()”. The program can be case insensitive (i.e. capital or small letters are treated the same).

List for your evaluation

Systems
Programming
Deep
Learning
Internet
Things
Robotics
Course

If given user input A or a: sort in alphabetical order (a comes first) If given user input D or d: sort in reverse alphabetical order(z comes first)

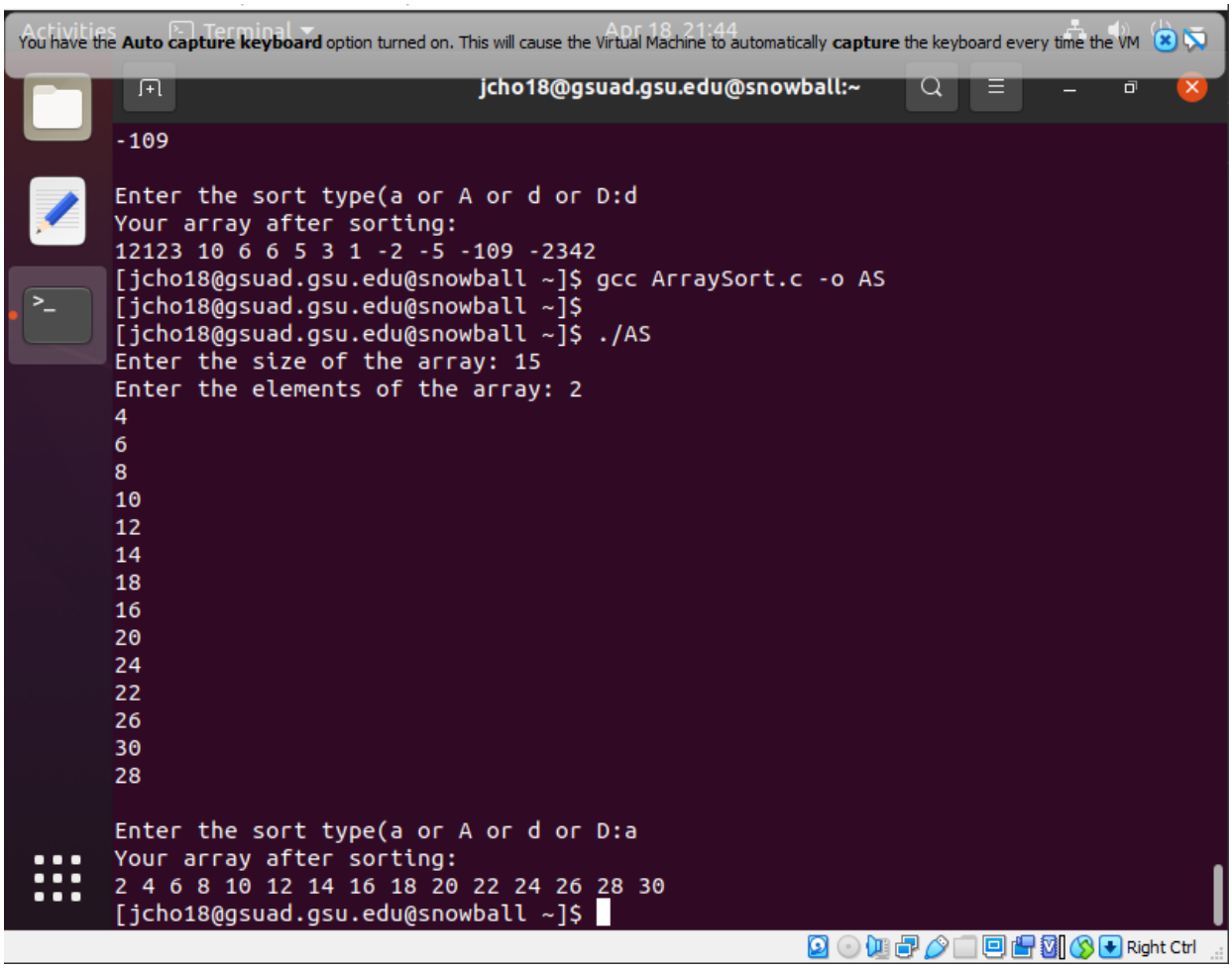
```
[jcho18@gsuad.gsu.edu@snowball ~]$ gcc StringSort.c -o SS
[jcho18@gsuad.gsu.edu@snowball ~]$ ./SS
Array is :
Systems    Programming    Deep    Learning    Internet    Things    Robotics
 Course

Enter A/a for ascending order, D/d for descending order: a

Array after sort :
Course    Deep    Internet    Learning    Programming    Robotics    Systems
 Things    [jcho18@gsuad.gsu.edu@snowball ~]$ ./SS
Array is :
Systems    Programming    Deep    Learning    Internet    Things    Robotics
 Course

Enter A/a for ascending order, D/d for descending order: d

Array after sort :
Things    Systems    Robotics    Programming    Learning    Internet    Deep
 Course    [jcho18@gsuad.gsu.edu@snowball ~]$
```

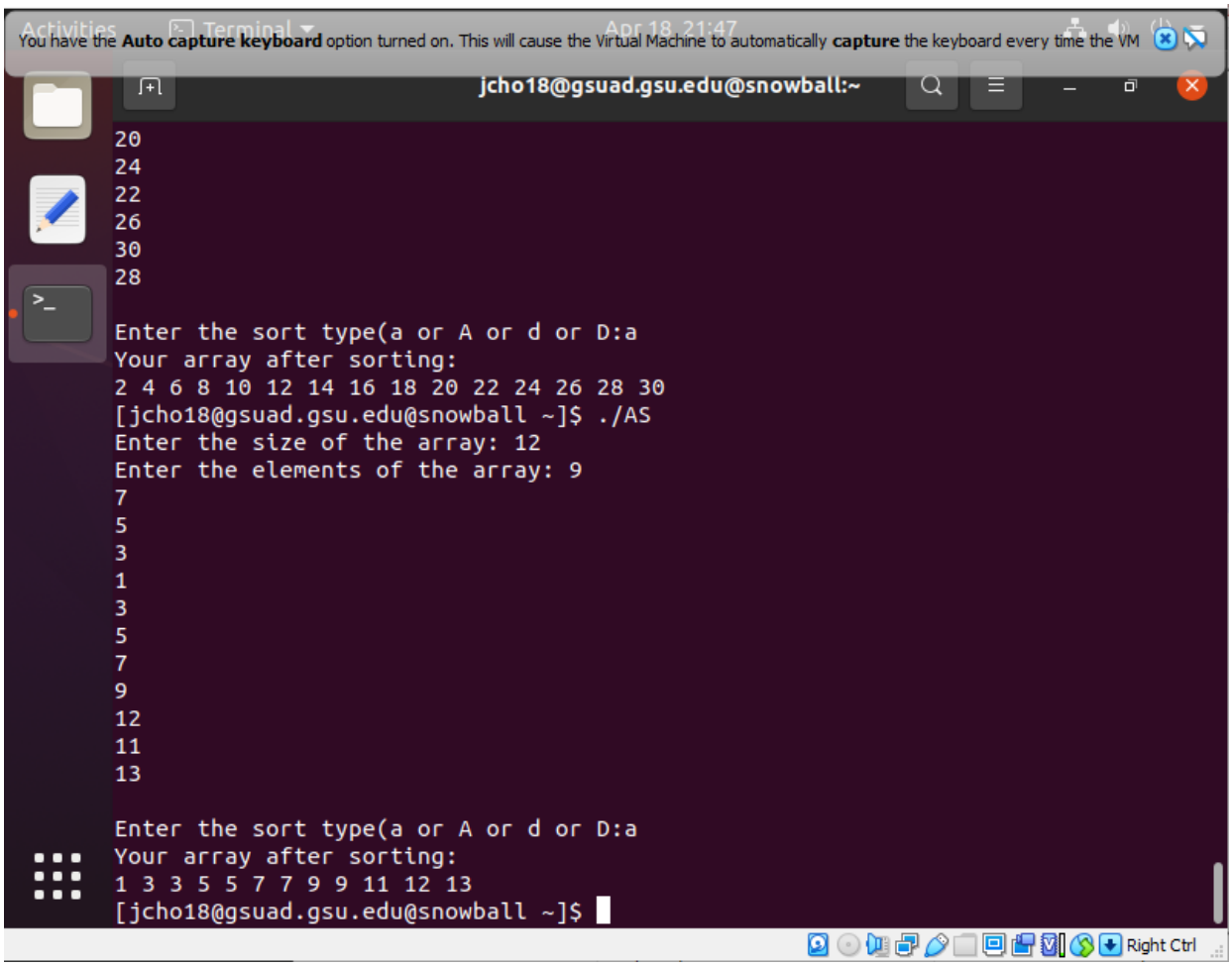
3. Repeat Question 1 or Question 2, considering that the number of elements can potentially increase. That is, the size of the array will be unknown at the start of the program. Note that the requirement of using pointers still holds.

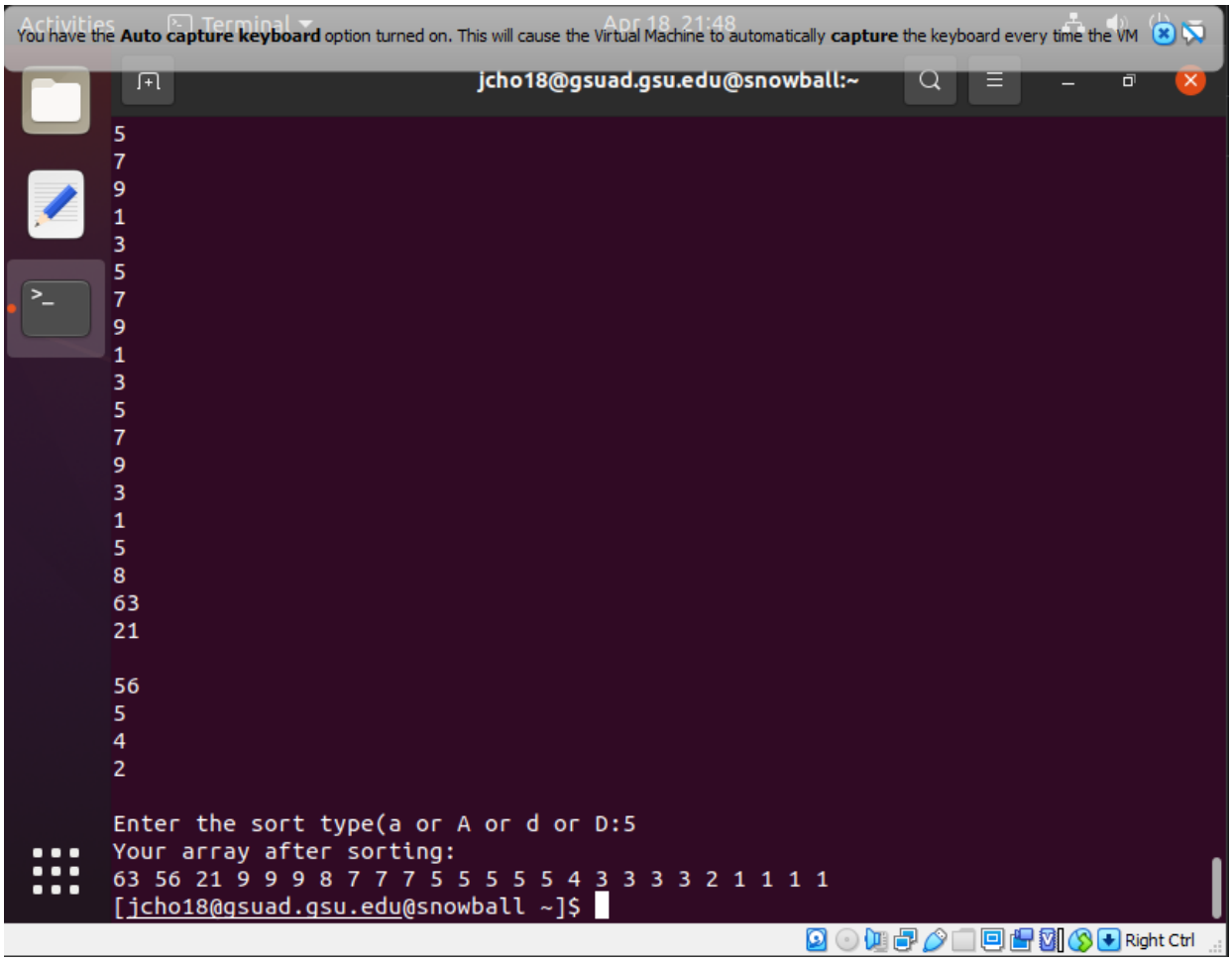
Show proof of evaluation of your program being able to work for more than 10 entries. Show 5 evaluation trials in your submission. You can pick any number of entries between 10 and 30 for your trials.

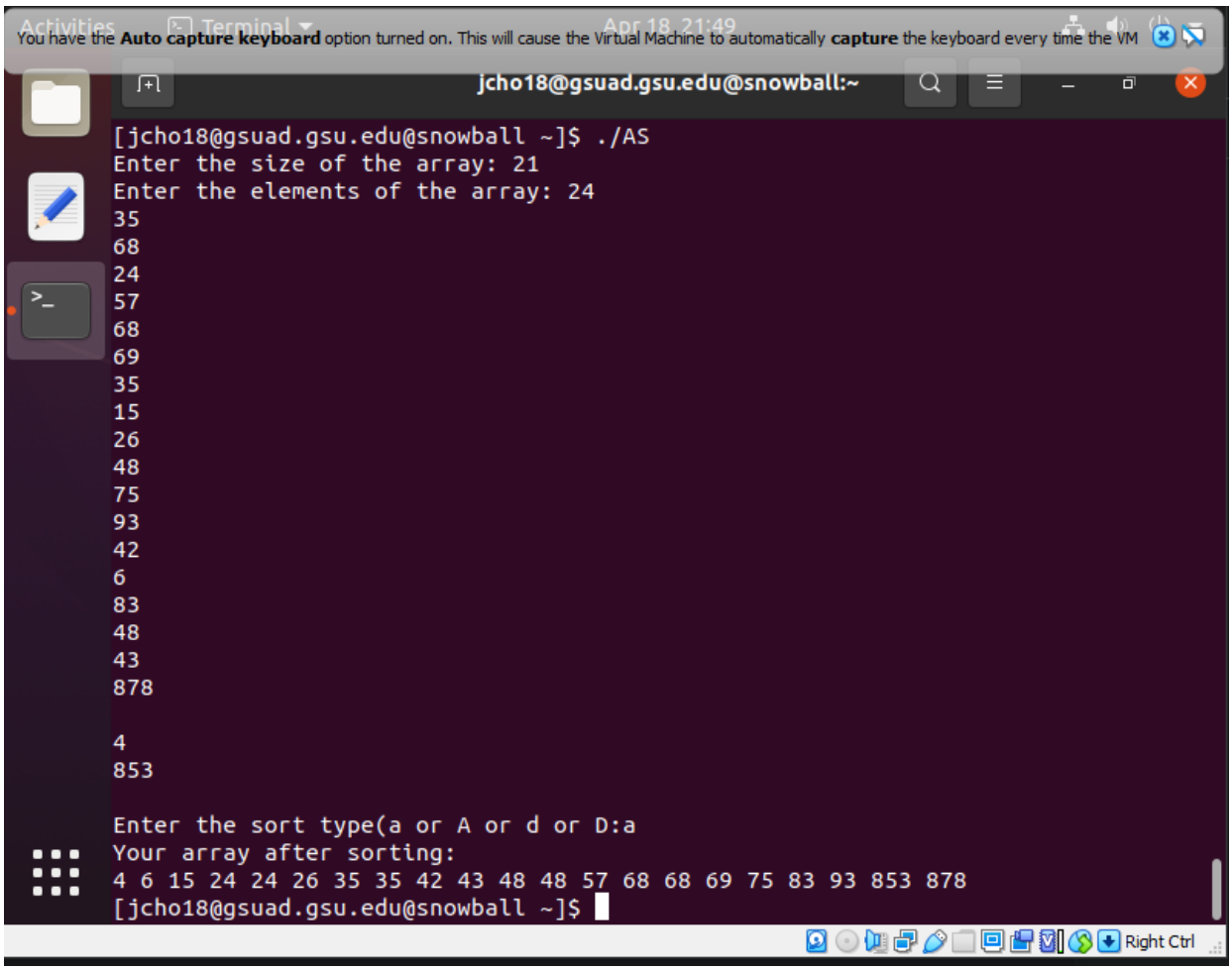
(Hint: *To solve this, use dynamic memory allocation, where you will NOT treat the input array as a known or finite size. Allocate memory space (e.g. malloc()) as and when the number of elements in the list increases).*

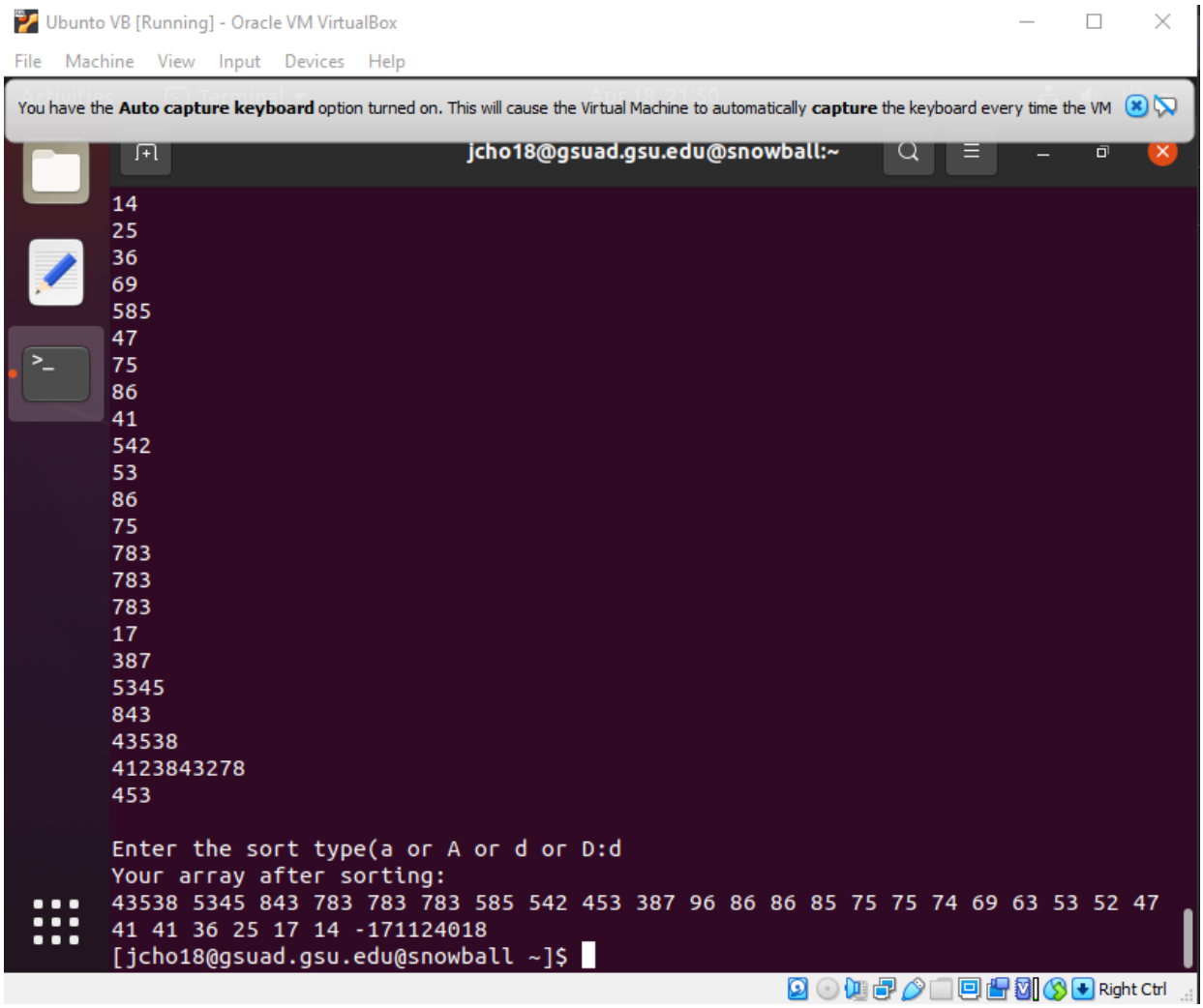
REPEATING QUESTION 1




Activities
Terminal
Apr 18 21:47
You have the Auto capture keyboard option turned on. This will cause the Virtual Machine to automatically capture the keyboard every time the VM
jcho18@gsuad.gsu.edu@snowball:~
20
24
22
26
30
28
Enter the sort type(a or A or d or D:a
Your array after sorting:
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
[jcho18@gsuad.gsu.edu@snowball ~]$ ./AS
Enter the size of the array: 12
Enter the elements of the array: 9
7
5
3
1
3
5
7
9
12
11
13
Enter the sort type(a or A or d or D:a
Your array after sorting:
1 3 3 5 5 7 7 9 9 11 12 13
[jcho18@gsuad.gsu.edu@snowball ~]$
Right Ctrl


Activities
Terminal
Apr 18 21:48
You have the Auto capture keyboard option turned on. This will cause the Virtual Machine to automatically capture the keyboard every time the VM
jcho18@gsuad.gsu.edu@snowball:~
5
7
9
1
3
5
7
9
1
3
5
7
9
3
1
5
8
63
21
56
5
4
2
Enter the sort type(a or A or d or D:5
Your array after sorting:
63 56 21 9 9 9 8 7 7 7 5 5 5 5 5 4 3 3 3 3 2 1 1 1 1
[jcho18@gsuad.gsu.edu@snowball ~]$
Right Ctrl


Activities
Terminal
Apr 18 21:49
You have the Auto capture keyboard option turned on. This will cause the Virtual Machine to automatically capture the keyboard every time the VM
jcho18@gsuad.gsu.edu@snowball:~
[jcho18@gsuad.gsu.edu@snowball ~]$ ./AS
Enter the size of the array: 21
Enter the elements of the array: 24
35
68
24
57
68
69
35
15
26
48
75
93
42
6
83
48
43
878
4
853
Enter the sort type(a or A or d or D:a
Your array after sorting:
4 6 15 24 24 26 35 35 42 43 48 48 57 68 68 69 75 83 93 853 878
[jcho18@gsuad.gsu.edu@snowball ~]$
Right Ctrl



4. Using C programming and using Structures or Unions in your program, build a COVID vaccine registration form where any user can register by filling in their First Name, Last Name, Date of Birth (mm/dd/yyyy), Sex, Dose number (1 or 2), Date of previous dose, Type of vaccine (Pfizer, Moderna, Johnson&Johnson), Residential zipcode.

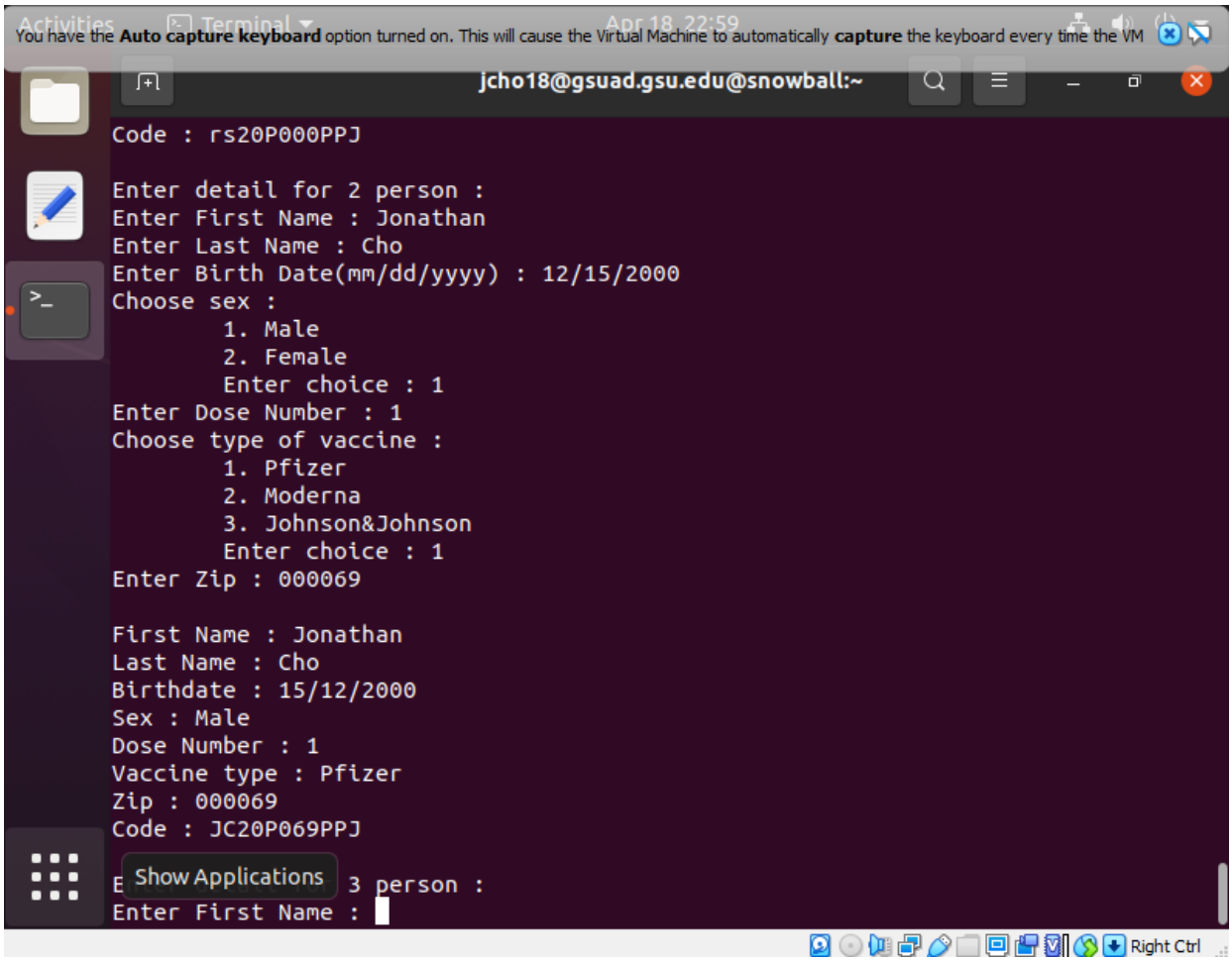
   Upon registration, the system must output a 8 letter alphanumeric code that will be unique to that user. The code is generated as <First letter of First

Name><First Letter of Last Name><current age of user -as of registration date><First letter of Vaccine type><last 3 numbers of zipcode>

Add functionality in your program such that it will display all the user's information on the screen (one item in each line).

Show an evaluation trial for registering at least 10 users. For registration, ,for relevant questions, users must choose values based on the options provided (e.g. sex; options must be Male/Female/Do not wish to identify)

(Hint: Write a program that contains main(), register(), generate_code() and retrieve() functions, at the least).


Activities
Terminal
Apr 18 22:59
You have the Auto capture keyboard option turned on. This will cause the Virtual Machine to automatically capture the keyboard every time the VM
jcho18@gsuad.gsu.edu@snowball:~
Code : rs20P000PPJ
Enter detail for 2 person :
Enter First Name : Jonathan
Enter Last Name : Cho
Enter Birth Date(mm/dd/yyyy) : 12/15/2000
Choose sex :
1. Male
2. Female
Enter choice : 1
Enter Dose Number : 1
Choose type of vaccine :
1. Pfizer
2. Moderna
3. Johnson&Johnson
Enter choice : 1
Enter Zip : 000069
First Name : Jonathan
Last Name : Cho
Birthdate : 15/12/2000
Sex : Male
Dose Number : 1
Vaccine type : Pfizer
Zip : 000069
Code : JC20P069PPJ
Show Applications
3 person :
Enter First Name :
Right Ctrl